CLAIMS

What is claimed is:

1. A seed layer structure for a hard magnetic material, comprising:

a) at least a first underlayer and a second underlayer located above said first underlayer;

b) at least a first interlayer located between said first underlayer and said second underlayer; and

c) a hard magnetic material located above said second underlayer.

2. The seed layer structure in claim 1 further comprising a third underlayer and a second interlayer each located above said second underlayer and below said hard magnetic material, wherein said second interlayer is located between said second underlayer and said third underlayer.

3. The seed layer structure in claim 2 further comprising a fourth underlayer and a third interlayer each located above said third underlayer and below said hard magnetic material, wherein said third interlayer is located between said third underlayer and said fourth underlayer.

4. The seed layer structure in claim 1 further comprising a plurality of alternating underlayers and interlayers each located above said second underlayer and below said hard magnetic material.

5. The seed layer structure in claim 1 wherein said first underlayer and said second underlayer are Cr.

6. The seed layer structure in claim 1 wherein said first underlayer and said second underlayer are an alloy selected from the group consisting of Cr_XMo_{1-X}, Cr_XMn_{1-X}, Cr_XTi_{1-X} and Cr_XV_{1-X}

7. The seed layer structure in claim 1 wherein said first interlayer is an oxide.

8. The seed layer structure in claim 7 wherein said oxide is selected from the group consisting of oxides of aluminum, oxides of tantalum, oxides of silicon and oxides of hafnium.

9. The seed layer structure in claim 1 wherein thickness of said first underlayer and thickness of said second underlayer are each substantially greater than 3 nm.

10. The seed layer structure in claim 1 wherein thickness of said first interlayer is substantially between 0.1 nm and 10 nm.

11. The seed layer structure in claim 1 wherein said hard magnetic material provides longitudinal bias to a ferromagnetic layer in a magnetic sensor.

12. The seed layer structure in claim 11 wherein said magnetic sensor is a giant magnetoresistive sensor.

13. The seed layer structure in claim 11 wherein said magnetic sensor is a tunnel valve sensor.

14. The seed layer structure in claim 11 wherein said magnetic sensor is an anisotropic magnetoresistive sensor.

15. The seed layer structure in claim 11 wherein said magnetic sensor is selected from the group consisting of top spin valve sensors, bottom spin valve sensors, giant magnetoresistive sensors, tunnel valve sensors and anisotropic magnetoresistive sensors.

16. A magnetic sensor for sensing an external magnetic field, comprising:

a) at least one ferromagnetic layer with a magnetization responsive to said external magnetic field; and

b) a longitudinal bias structure positioned adjacent to said ferromagnetic layer for biasing said ferromagnetic layer, said longitudinal bias structure comprising:

1) at least a first underlayer and a second underlayer located above said first underlayer, wherein said first underlayer and said second underlayer are selected from the group consisting of Cr, Cr_XMo_{1-X}, Cr_XMn_{1-X}, Cr_XTi_{1-X} and Cr_XV_{1-X};

2) at least a first interlayer located between said first underlayer and said second underlayer, wherein said first interlayer is selected from the group consisting of oxides of aluminum, oxides of tantalum, oxides of silicon and oxides of hafnium; and

3) a hard magnetic material located above said second underlayer.

17. The magnetic sensor in claim 16 further comprising a third underlayer and a second interlayer each located above said second underlayer and below said hard magnetic material in said longitudinal bias structure, wherein said second interlayer is located between said second underlayer and said third underlayer.

18. The magnetic sensor in claim 17 further comprising a fourth underlayer and a third interlayer each located above said third underlayer and below said hard magnetic material in said longitudinal bias structure, wherein said third interlayer is located between said third underlayer and said fourth underlayer.

19. The magnetic sensor in claim 16 further comprising a plurality of alternating underlayers and interlayers each located above said second underlayer and below said hard magnetic material in said longitudinal bias structure.

20. The magnetic sensor in claim 16 wherein said magnetic sensor is selected from the group consisting of top spin valve sensors, bottom spin valve sensors, giant magnetoresistive sensors, tunnel valve sensors and anisotropic magnetoresistive sensors.

21. The magnetic sensor in claim 16 wherein thickness of said first underlayer and thickness of said second underlayer are each substantially greater than 3 nm.

22. The magnetic sensor in claim 16 wherein thickness of said first interlayer is substantially between 0.1 nm and 10 nm.

23. A magnetic read head for sensing an external magnetic field, comprising:

a) a magnetic sensor having at least one ferromagnetic layer with a magnetization responsive to said external magnetic field; and

b) a longitudinal bias structure positioned adjacent to said ferromagnetic layer for biasing said ferromagnetic layer, said longitudinal bias structure comprising:

1) at least a first underlayer and a second underlayer located above said first underlayer, wherein said first underlayer and said second underlayer are selected from the group consisting of Cr, Cr_XMo_{1-X}, Cr_XMn_{1-X}, Cr_XTi_{1-X} and Cr_XV_{1-X};

2) at least a first interlayer located between said first underlayer and said second underlayer, wherein said first interlayer is selected from the group consisting of oxides of aluminum, oxides of tantalum, oxides of silicon and oxides of hafnium; and

3) a hard magnetic material located above said second underlayer.

24. The magnetic read head in claim 23 further comprising a third underlayer and a second interlayer each located above said second underlayer and below said hard magnetic material in said longitudinal bias structure, wherein said second interlayer is located between said second underlayer and said third underlayer.

25. The magnetic read head in claim 24 further comprising a fourth underlayer and a third interlayer each located above said third underlayer and below said hard magnetic material in said longitudinal bias structure, wherein said third interlayer is located between said third underlayer and said fourth underlayer.

26. The magnetic read head in claim 23 further comprising a plurality of alternating underlayers and interlayers each located above said second underlayer and below said hard magnetic material in said longitudinal bias structure.

27. The magnetic read head in claim 23 wherein said magnetic sensor is selected from the group consisting of top spin valve sensors, bottom spin valve sensors, giant magnetoresistive sensors, tunnel valve sensors and anisotropic magnetoresistive sensors.

28. The magnetic read head in claim 23 wherein thickness of said first underlayer and thickness of said second underlayer in said longitudinal bias structure are each substantially greater than 3 nm.

29. The magnetic read head in claim 23 wherein thickness of said first interlayer in said longitudinal bias structure is substantially between 0.1 nm and 10 nm.